

Appl. No. 09/975,444
Reply to Office action of 06/07/2004

REMARKS

Reconsideration of the above-referenced application in view of the above amendment, and of the following remarks, is respectfully requested.

Claims 12-16 are pending in this case. Claim 12 is amended herein and claims 17-22 are cancelled herein.

The Examiner rejected claims 12, 13, 14, 15, and 16 under 35 U.S.C. § 103(a) as being unpatentable over the applicant's prior art (AAPA) of this application in view of Iacoponi et al. (U.S. Patent 6,228,754) in view of Chen et al. (U.S. Patent 6,140,227).

Applicant respectfully submits that amended claim 12 is patentable over the AAPA in view of Iacoponi et al and Chen et al as there is no disclosure or suggestion in the references of depositing a liner/barrier layer over a dielectric layer, performing a sputter etch of the liner/barrier layer using a low bias after the step of depositing a liner/barrier layer, and depositing a seed layer on the liner/barrier layer after the step of performing the sputter etch. As the Examiner noted, the AAPA fails to teach performing a sputter etch after the step of depositing a liner/barrier layer. Iacoponi is applied to teach a trench and a via. Chen teaches a sputter etch of a first glue/barrier layer followed by the deposition of a second glue/barrier layer and a metal fill of the plug. Chen does not disclose or suggest a seed layer. Chen does teach a bi-layer barrier wherein the first layer is sputter etched prior to depositing the second layer. The combined references would not suggest to one of ordinary skill in the art depositing a liner/barrier layer over a dielectric layer, performing a sputter etch of the liner/barrier layer using a low bias, and then depositing a seed layer on the sputter-etched liner/barrier layer. Accordingly, Applicant respectfully submits that claim 12 and the claims dependent thereon are patentable over the references.

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The Examiner rejected claims 17, 18, 19, 20, 21, and 22 under 35 U.S.C. § 103(a) as being unpatentable over the applicant's prior art (AAPA) of this application in view of Iacoponi et al. (U.S. Patent 6,228,754).

Claims 17-22 are cancelled. However, applicant respectfully submits that claim 17 is patentable over the AAPA in view of Iacoponi as there is no disclosure or suggestion in the references of depositing a liner layer, wherein the liner layer has an overhang portion, performing a sputter etch using a low bias to at least reduce a thickness of the overhang portion of the liner layer after the step of depositing the liner layer, and depositing a barrier layer over the liner layer after the step of performing the sputter etch. The AAPA fails to teach performing a sputter etch after the step of depositing a liner. Iacoponi teaches performing a sputter etch of a PVD deposited seed layer. Iacoponi teaches a sputter etch to overcome the problems associated with a PVD deposited seed layer. There is no disclosure or suggestion for modifying the AAPA process to include a sputter etch of a PVD deposited seed layer and then further modifying the sputter etch to perform it on an overhang portion of a liner layer instead of a seed layer.

The differences between the teachings of the prior art are more than a re-ordering of process steps. The sputter etches are different: Iacoponi uses a sputter etch of a seed layer and the claimed invention requires a sputter etch of the liner layer. There is no disclosure or suggestion in the references of performing a sputter etch to reduce an overhang portion of a liner layer and then, subsequently, depositing a barrier layer. Accordingly, Applicant respectfully submits that claim 17 and the claims dependent thereon are patentable over the AAPA in view of Iacoponi.

In light of the above, Applicant respectfully requests withdrawal of the Examiner's rejections and allowance of claims 12-16. If the Examiner has any questions or other

Appl. No. 09/975,444
Reply to Office action of 06/07/2004

correspondence regarding this application, Applicant requests that the Examiner contact Applicant's attorney at the below listed telephone number and address.

Respectfully submitted,



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